Name:

at1124exam: Radicals and Squares (v905)

Question 1

Simplify the radical expressions.

$\sqrt{18}$ $\sqrt{27}$ $\sqrt{98}$

$\sqrt{3 \cdot 3 \cdot 2}$ $\sqrt{3 \cdot 3 \cdot 3}$ $\sqrt{7 \cdot 7 \cdot 2}$

$3\sqrt{2}$ $3\sqrt{3}$ $7\sqrt{2}$

Question 2

Find all solutions to the equation below:

$$3(x+9)^2 + 8 \;=\; 83$$

First, subtract 8 from both sides.

$$3(x+9)^2 = 75$$

Then, divide both sides by 3.

$$(x+9)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 9 = \pm 5$$

Subtract 9 from both sides.

$$x = -9 \pm 5$$

So the two solutions are $x = -4$ and $x = -14$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 6x = 40$$

$$x^2 + 6x + 9 = 40 + 9$$
$$x^2 + 6x + 9 = 49$$
$$(x+3)^2 = 49$$
$$x + 3 = \pm 7$$
$$x = -3 \pm 7$$
$$x = 4 \quad \text{or} \quad x = -10$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 2x^2 - 24x + 65$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 - 12x) + 65$$

We want a perfect square. Halve -12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 - 12x + 36 - 36) + 65$$

Factor the perfect-square trinomial.

$$y = 2((x-6)^2 - 36) + 65$$

Distribute the 2.

$$y = 2(x-6)^2 - 72 + 65$$

Combine the constants to get **vertex form**:

$$y = 2(x-6)^2 - 7$$

The vertex is at point $(6, -7)$.